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PAPERS
IN
COLONIES AND TRADE.

The SILVER MEDAL, set in Gold, was this Session voted to PHILLIPS LONDON, Esq. of Cannon-Street, for curing Mackarel for Exportation or Winter Use. The following Communication was received from him, an explanatory Engraving is annexed, and the Hydrometer, or Instrument for ascertaining the proper Saltiness of the Pickle, is preserved in the Society's Repository.

SIR,

I HEREWITH send you a half barrel of mackarel, part of twenty-five thousand mackarel cured on my plan ; also Mr. Cutler's certificate, that so many were cured at Ramsgate during the last season, most of which were shipped for Russia. They were all cured by immersion in brine of British solid salt, agreeably to the method I had the honour of communicating to the Society, and which is printed in the thirty-second volume of the Society's Transactions, p. 204. The whole were extremely fine,

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and full as beautiful as the specimen sent, which I hope will meet the approbation of the Society.

I am, Sir,

Your obedient Servant,

PHILLIPS LONDON.

No. 57, Cannon-Street, London,

Feb. 14, 1815.

To C. TAYLOR, M.D. SEC.

From Mr. London's statement at a Meeting of the Committee, it appears that the brine ought always to contain a redundancy of salt; in such case there is not the least danger of the fish putrifying or growing rancid, as the extra lumps of solid salt in the brine immediately act upon any watery or other liquors which proceed from the fish when inclosed in the cask. That the same process will also answer perfectly well for preserving beef or any animal food for sea store.

CERTIFICATE.

MR. LONDON cured by his new process under my immediate inspection upwards of 25,000 mackarel at Ramsgate, in Kent, during the last season

JOHN CUTLER, Licensed Fish Curer,
at Ramsgate, Kent.

September 28, 1814.

Reference

*Reference to the Engraving of Mr. London's Hydrometer.
Plate 16, Fig. 3.*

THIS instrument consists of a glass bottle, with a ground glass stopper, to be filled with brine made from a solution of solid salt in water ; within it are three glass bubbles, *a, b, c*, of different specific gravities, so graduated that, supposing the temperature of the air to be at sixty degrees of Fahrenheit's thermometer, and only one bubble floats on the surface, as shown in the engraving at *a*, it indicates the specific gravity of the brine to be 1.155, containing about 20 parts salt, and 80 of water, which is insufficient to cure animal matters with certainty by immersion in it.

When the second bubble, *c*, floats, it indicates the specific gravity of the brine to be 1.180, or about 24 parts salt, and 76 parts water, which may be used for the purpose of immersion.

But when the three bubbles, *a, b, c*, float, they indicate the specific gravity to be 1.106, or about 28 salt, and 72 water.

This brine will fully answer the purpose in the hottest weather in most climates, provided the rules be attended to which I had the honour to send to the Society last year, and the meat or fish always completely covered with the brine.

PHILLIPS LONDON.

The following Communication relative to the labours of the late Dr. William Roxburgh, whose Portrait is prefixed to the Frontispiece of the present Volume, will give some idea of the Services he has rendered to this Society and the Public.

WILLIAM ROXBURGH, M.D. F.L.S. late Superintendant of the Hon. East India Company's Botanical Garden at Calcutta, died at Edinburgh, in May, 1815. He was the intimate friend and pupil of the celebrated König, and with Sir William Jones, Warren Hastings, Esq. Lord Teignmouth, and the principal scientific characters in Bengal, laid the foundation of the Asiatic Society. In the extent of his researches, and the profundity of his knowledge on botanical subjects, he was unrivalled, and may be classed among the most eminent botanists since the time of Linnæus.

Dr. Roxburgh was born at Underwood, in the parish of Craigie, near Lymington, in Ayrshire, on the 29th of June, 1750, he studied medicine, and attended the college at Edinburgh, under the patronage of Dr. Boswell, who was so much attached to him as to consider him with paternal regard, and with whom he corresponded till Dr. Boswell's death.

After two voyages to the East Indies, he had an offer made him to remain at Madras, which he accepted in 1774 or 1775, and would some years ago have been at the head of the medical board there, or physician general to that establishment, had he remained at Madras; but he accepted the invitations of government at Bengal to take charge of the botanical department there.

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He has left a widow, and eleven children, six sons, and five daughters, part 'by his present widow, the granddaughter of the Dr. Boswell abovementioned, and part by a former wife.

When Dr. Roxburgh was at Madras, he began that most valuable work entitled, "Descriptions and Drawings of Coromandel Plants," and made innumerable discoveries in natural history, not only from his own actual inspection, but by correspondencies which he established with scientific men in every part of the world.

On his entering the East India company's service, about thirty-eight years ago, he began his correspondence with the late Sir John Pringle, then President of the Royal Society, to whom he sent various Indian products, and amongst them seeds put up in the mucilage of gum-arabic, which hardened round them; and was informed by Sir John Pringle, that he received them in a better state of preservation, particularly the *Mimosas*, than he had ever seen the same kinds arrive from countries equally distant. It was during this period that Dr. R. first observed the two diurnal risings and fallings of the barometer (ærial tides) in low latitudes, which has since been confirmed by various meteorologists. The diary wherein this phenomenon is noted, was kept by Dr. R. at *Fort St. George*, and published by Sir John Pringle in the *Philosophical Transactions*.

His description and figures of the *Lacc insect* (*Chermes Lacca*, Linn.) written in 1789 and 90, were published in the *Asiatic Researches*, whereunto was added a conjecture that the colouring matter from which the insect derives much of its value, might be separated while the colour is brightest, that is while alive, or recent. The idea has

since been adopted, and successfully followed up by several ingenious gentlemen in *Bengal*, and now forms a branch of trade from *Calcutta* to *London*, under the name of *Lacc-lake*. As the *Asiatic Researches* is rather a scarce book and in the hands of but few, the following is a copy of what Dr. R. said on this subject, extracted from the original MS.

“The eggs and dark-coloured glutinous liquor they are found in, communicates to water a most beautiful red colour while fresh; after it has been dried, the colour it gives to the same menstruum is less bright; it would therefore be well worth while for those who are situated near places where the insect, or fresh-gathered *Lacc* is plentiful, to try to extract and preserve the colouring principle, by such means as would prevent it from being injured by keeping; and I doubt not but in time a method may be discovered to render this colouring matter as valuable as that of *Cochineal*.”

“Mr. Hellot’s process for extracting the colouring matter from old dry *Lacc*, deserves to be tried with fresh *Lacc* in the month of October, or beginning of November, before the insects have acquired life, for I found the deepest and best colour was procured from the eggs while mixed with their nidus.”

His process is as follows:

“Let some powdered *Gum Lacc* be digested two hours in a decoction of *comfry* root, by which a fine crimson colour is given to the water, and the gum is rendered pale or straw-coloured. To this tincture poured off clear, let a solution of *alum* be added, and when the colouring matter has subsided let it be separated from the clear liquor and dried. It will weigh about one-fifth of the quantity of the *lacc* employed. This dried fecula is to be dissolved

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“ved or diffused in warm water, and some solution of *tin*
 “added to it, by which it acquires a vivid scarlet colour.
 “This liquor is to be added to a solution of *tartar* in boiling
 “water, and thus the dye is prepared. In *India*, *comfry*
 “roots are not to be had; any other colourless mucila-
 “ginous root, gum, or bark, would probably answer
 “equally well. On some parts of the coast of *Coro-*
 “*mandel*, if not over it all, a decoction of the seeds of a
 “very common plant, *cassia tora* of Linnæus, is used by
 “the blue dyers of cotton cloth to help to prepare the blue
 “vat. It suspends the indigo till a fermentation takes
 “place to dissolve it, and also helps to bring about that
 “fermentation earlier than it otherwise would.”

About the same time he wrote the greater part of his papers on the Hindoo method of cultivating the *sugar cane*, and manufacturing the sugar, part of which, together with remarks on the copper coin of the *Northern Circars*, were sent to the late Alexander Dalrymple, and published by him in the second volume of his *Oriental Repertory*. The former paper has since been much enlarged by adding the Bengalée and Chinese practice, and may at this very interesting time be of use if published by the *African Institution*, or any other public body, with the view of reducing the demand for slaves in our various colonies in the *West Indies* and *South America*, by introducing the plough instead of the hoe and spade now in use *. We learn from the reports of the same *Institution*, how serviceable the Doctor has been in aiding the benevolent views of the directors, by sending them annually, or oftener, the various useful vegetable products of India.

By the Researches of Colonel Hardwicke, a *vegetable butter*, called *fulleva*, or *fullevara*, by the Hindoos, was dis-

* See an original paper just now in the possession of the African Institution.

covered to be the produce of a tree growing on the *Almora* mountains, and in use for various economical purposes amongst the natives. The indefatigable mind of Dr. R. did not rest until he had discovered the tree, and ascertained the process by which the *butter* was procured; it proved a new species of *Bassia*, nearly allied to Parke's *African Butter Tree*, a description and figures thereof he gave to the world in the *Asiatic Researches*.

His various discoveries of substitutes for *hemp* and *flax*, made at a time when they were an object of much national importance, are recorded in the volumes of the transactions of this Society, and in the publications of Joseph Cotton, Esq, the most valuable of which we may consider that noble palm tree the *Gomuto*, his *Sagueris Numphii*, which not only yields a large portion of the fibres called *Ejoo* by the Malays, very generally used for cables, &c. but also furnishes much *Sago-meal*, *Palm-wine*, and *Thatch* for covering the habitations of the natives where the trees grow. In *Ceylon* the fishermen make their fishing lines of single fibre, joined until of sufficient length to answer their purpose in the deepest water.

THE following Copy of a Letter from the Chairman and Deputy Chairman, and of the Extract of a General Letter from the Court of Directors, to the Governor General (the Hon. Marquis WELLESLEY), proved highly encouraging for the Doctor to proceed eagerly in search of substitutes for *Hemp* and *Flax*, a pursuit which he had commenced many years previous to the date of those documents.

“ To the Most Noble the Governor General in Council
of Bengal.

“ Having taken into our serious consideration the subject of obtaining hemp from India, we are exceedingly
anxious

anxious to promote the wishes of his Majesty's Ministers on that head, and therefore recommend the same to your particular attention.

“European hemp has encreased in price since the year 1792, from 23*l.* 10*s.* to 61*l.* per ton, which is the present price. As Russia has almost the exclusive supply of this article, it is obvious that she may raise the price of it at her will. Such a precarious dependence on a foreign power for an article on which our political existence so much depends, is certainly too hazardous to be relied on, provided we can remedy the evil by obtaining a supply from our own possessions. This we conceive might be effected in this country or in Ireland, but converting so much of the best corn lands to the cultivation of hemp, might in the present state of those countries with respect to grain, be liable to objection, we see no inconvenience, however, likely to arise from growing it in India, where so much rich soil remains uncultivated. The importance of this kingdom being independent of Russia, or any other country, in her supply of this article, and the facility with which we conceive it might be raised in India, make us anxiously desirous that its cultivation there should be extended as much as possible. According to the information we have received from Mr. Bebb, late a Member of your Board of Trade, we are happy to learn, that two hundred acres are already under cultivation, and with a fair prospect of the article being brought to perfection. The present annual consumption of Great Britain may be estimated at from twenty-five to thirty thousand tons. A few thousand tons imported from India would have an immediate favourable effect upon the price of European hemp. Even the import of one thousand tons might for the above reasons lower the price considerably. Although
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therefore the cost of one thousand tons might at first be high, this circumstance would be more than counter-balanced by the reduction in the price of thirty thousand tons. We point out this that you may spare neither trouble nor pains to furnish us with a speedy supply.

As Government here takes upon itself the risk and expence attending this experiment, a separate head must of course be kept for 'Charges incurred in raising hemp,' that the same may be brought to the debit of Government.

"It will be necessary for the purpose of saving freight, that the hemp should be dressed so completely as to leave as little refuse as possible.

"We shall endeavour to furnish you with a quantity of the best seed, and such implements of husbandry as we think may be useful. We shall also endeavour to send out some men practised in the progress of planting, growing, and dressing it.

"From Captain Burrowes's Report, the ropes made of Sunn, at Calcutta, and used in the running rigging of the Earl Howe for a trial, appear to have been equal in strength to the best English rope in the ship. You will therefore collect and send us as great a quantity as possible of this article, prepared in the same manner as that in which the before-mentioned ropes were made*.

"The samples before sent of this article were so dry and ill-prepared, from having been collected, we apprehend, too late, as not to answer the purpose for which it was sent.

Signed,

"DAVID SCOTT,

"JOHN MANSHIP.

"*East India House, London, Oct. 10, 1800.*"

* The ropes furnished to Captain Burrows by the Board of Trade or Marine Board, were made of *Sunn* and not of hemp. R.

Extract

Extract from a General Letter from the Honourable the Court of Directors, under date the 26th March, 1801, in the Public Department.

178 d. 82 Cultivation of hemp, &c. 39.

“ We very much approve of your having complied with the recommendation of the Marine Board for appropriating two hundred acres of land for the cultivation of hemp of the sort that is deemed the fittest for cordage and canvas, and cannot too earnestly recommend the exertion of your best endeavours for bringing the experiment to a favourable issue. Last season we forwarded to you by the Kent, a quantity of seed for the purpose of ascertaining whether the hemp and flax of this country possess properties in any degree superior to the sorts at present in cultivation in the provinces under your government. On account of the death of Mr. Sinclair, to whom a part of these seeds was to have been delivered, in order that the experiment might be made, it is our intention to send out persons conversant in the cultivation and management of these articles, to whom every proper encouragement and support is to be given, that we may be enabled to form a correct opinion of the measures to be pursued in future for an extended growth of hemp and flax, with a view of their becoming of importance, as articles of import for the general advantage of the maritime and manufacturing interests of the United Kingdom of Great Britain and Ireland.”

“ Upon a supposition that some of the experiment hemp either has been or will be manufactured into cables and cordage for the use of the country trade, we direct that the
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the commander of one or more of our returning ships, be furnished with a sample sufficient for ascertaining its quality during the homeward voyage, that they may be enabled to report thereon to us upon their arrival.

“ We must at the same time call to your recollection the report which was made to you on the 24th August, 1798, by the acting Superintendant of the Company’s Botanical Garden relative to the properties of the *Gomuto* tree, the fibres of which are said to be manufactured into cables and cordage of peculiar strength and durability. The Superintendant having represented that the cultivation of the *Gomuto* tree, of which we are now in complete possession, may be carried on to any extent; we direct that you inform us of the measures that have been pursued for this purpose in consequence of your resolution of the 1st October, 1790, for procuring a further supply of the *Gomuto* plant and seeds from Amboyna and Bencoolen. You will likewise furnish us with samples of the *Gomuto* rope yarn. If any shall have been manufactured into ropes and cables, we wish an experiment may be made of their quality on some of our returning ships, the commanders of whom must be directed to pay particular attention thereto, that upon their arrival they may be able to report the result.

“ To Dr. Roxburgh the thriving spice plantations in *Sumatra* owe their existence, as on his representation the Supreme Government at Calcutta, authorised him in 1795—6, to send a person properly qualified to the *Moluccas*, to procure plants and seeds, particularly of the *nutmeg* and *clove* trees. And again in 1802—3, he sent his own son, then his assistant, on the same service. The result of the two expeditions may be seen in the following copy
of

of Walter Ewer's, Esq. the Governor of *Bencoolen*, official report of the state of those plantations, dated the 25th September, 1803.

A general Statement of the Spice Plantations on the West Coast of Sumatra.

	Nutmegs.	Cloves.	Remarks.
Imported in 1798, and in bearing .	48	1	Besides those in the gardens of individuals.
Do. in blossom, and advancing to maturity	275		
In great apparent luxuriance of growth, but not yet bearing, .		2	
Imported by Mr. ROXBURGH, and quite young,	22000	7000	
Total of spice-plants .	22323	7003	
Deduct as set apart for the garden in Calcutta . . .	1000	500	
They were not sent to the Botanic Garden.—Leaves . .	21323	6500	
Distribution of the plants lately imported by Mr. ROXBURGH.			
Retained for the Companies' Plantations,	8000		
Distributed to the Malay Chiefs, and villagers; and to individuals resident about Fort Marlbro, and at the out Settlements . .	13000		
Not yet dispersed, being too tender to be removed from the nursery,		6500	
	21000	6500	

Fort Marlbro', 25th Sept, 1803.

(Signed)

W. EWER, Commissioner.

During the dreadful famine of 1791, 2, 3, which reduced the population of the *Northern Circars*, to nearly one-half of what it was previous to that calamity; he drew up, and transmitted to the Government of Madras, suggestions for the introduction and extensive cultivation of all such vegetable products as might supply food to the natives

natives when the rice crop fails, and be an effectual substitute for granaries; which were not found to answer the benevolent intentions of Government. For this Paper he received the repeated thanks of the Court of Directors, accompanied with orders to the Government of Madras to take the necessary measure for putting these suggestions into execution, which was done.

Extract from the General Letter from England;—Dated April 23d, 1794 :—

“ IT gives us great concern to find, that, owing to the want of the periodical rains, the inhabitants of the Northern Circars, particularly those under Masulipatam, are again likely to suffer, on account of the expected scarcity of grain; but we hope the measures of the Bengal Government, for sending rice to your side of India, will lessen the calamities which a continuance of the famine would otherwise occasion. The humane suggestions of Dr. Roxburgh, referred to in the 8th paragraph of your public dispatch of the 2nd May, on the introduction of such useful trees, shrubs, and other plants as are deemed the most likely to yield sustenance to the poorer classes of natives in the times of scarcity, entitle him to our warmest praise; and we trust that your endeavours in consequence will prove successful. We deem the hints contained in the beforementioned Paper of Dr. Roxburgh of such consequence, inasmuch as they tend to lessen the calamitous effects of famine, that we desire to be acquainted from time to time of the progress that may be made in the cultivation of the seeds and plants recommended by him, and particularly whether you have been successful in your endeavours to procure the bread fruit tree from the Nicobar islands,

islands, and the tree mentioned in the Doctor's letter of the 21st February last, which bears a fruit called Mellore, and which is supposed to be infinitely superior to the bread fruit."

"We approve of the support you have given to Dr. Roxburgh's laudable efforts for introducing among the inhabitants of the coast new sources of sustenance, and new means of improving agriculture, and extending the Commerce of the country."

A true Extract.

(Signed,)

W. WEBB, SEC.

His numerous experiments on the manufacture of *Indigo* and discovery of plants which yield that drug, equal in quality to the best made from the common indigo plant, (*Indigofera tinctoria*) have been already given to the public in the 31st Volume of the Transactions of this Society.

The three wild sorts of the silk-worm, viz, *Tusseh*, *Arundi*, and *Maggadooty*, described and figured by the same hand, furnish the natives with an abundant supply of three different kinds of strong durable silk, highly useful, particularly the last, in the fabrication of various durable coarse clothes, and might, we have every reason to think, be a valuable acquisition to the British artists, in the manufactures of this country. One sort only is mentioned by Mr. Colebrooke, at page 179, of his "*Remarks on the Husbandry and internal Commerce of Bengal*." The two first viz. *Tusseh* (*Phalæna paplica*, Linn.) *Arundi*, (*Phalæna guthia*, Linn.) have been published in a Volume of the *Transactions of the Linnean Society of London*.

The introduction of useful objects into our Indian territories, and the general distribution of the rare vegetable products over most part of the world, formed a very large
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portion of his duty. The reports of the *African Institution* evince his endeavours to aid the benevolent views of the Directors thereof, and may be quoted as one instance of the liberality of the Hon. East India Company's Botanical Establishment, which he superintended. Amongst the most conspicuously useful plants introduced, are *all-spice*, *cotton* of various sorts, *nutmeg*, fruit trees of various kinds, *mahogany*, *logwood*. To these may be added new botanical discoveries of the same nature, such as several new species of *oak*, &c. yielding timber of a good quality for various purposes. His *swietenia febrifuga*, or *East India fever-bark*, an excellent substitute for Peruvian bark, which, for upwards of the last twenty years, has been successfully employed in various parts of the world, and now holds a place in our *Pharmacopeas*. In short, it would be a long and laborious task to give the bare names of his numerous discoveries; suffice therefore to say, that the number of his coloured drawings and descriptions of *Indian* plants, a large portion of them new, amount to near 3000: one of them, viz. No. 2141, is an immensely large and beautiful new species of the *fig-tree* (*figus*), which yields an abundant supply of *Caoutchouc*, or *Indian-rubber*, used by the natives of the Garrau, &c. mountains, east of *Bengal*, where the tree grows wild, to smear and render water-tight their baskets and utensils, and for torches to give light, &c. &c. See *Vol. 30, of the Transactions of this Society*.

* * * The Society have great pleasure to add, that from improvements lately made, the lacc is now in extensive use, in dying scarlet or woollen cloth, in place of cochineal.

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The following Suggestions on the means of supplying food to the Natives of India, when the Rice crop proves deficient, consequently a Substitute for Granaries, were communicated to the Society by the late Doctor William Roxburgh.

Query I. **W**HAT are the best substitutes for granaries, consequently for the prevention of famine, and its depopulating consequences?"

Answer. "The culture of every article of food congenial to the climate and prejudices of the people."

II. "Famine," says the *Hindoo philosopher*, "is a dreadful calamity, and originates in a want of *rice alone*! It has been incident to all ages, the *Satya*, the *Trita*, the *Dwaper*, and the *Kaliyugs*—It is the will of Iswara!"

Thus he lets the matter rest; no hint, or other attempt to lessen the effects of the *dreadful calamity*; the mere want of *rice*, by other sorts of grain, many of which are well known to be equally (probably even more) wholesome, and more nutritious than rice.

It is now (in 1814) twenty-one years since the effects of one of the most dreadful famines that we have any account of ceased in the *Northern Circars*, where it had raged, with all its dreadful consequences, for nearly three years, notwithstanding every effort of Government to send such relief as the time allowed. I was an eye witness to its effects during the whole time, and had charge of the distribution of Government rice for the relief of the poor classes about *Lamulcotah*, where above a thousand were daily fed. During this period I drew up a few suggestions for the introduction into these *Northern provinces*, of such useful vegetable productions as were deemed the

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most likely to give sustenance to the poorer classes of the natives during times of scarcity ; they were dated 27th January, 1793, and addressed to the Honourable Sir Charles Oakley, Bart. then Governor of *Fort St. George*. Soon after which, I was called to superintend the Honourable Company's Botanical Establishment in Bengal, though not before I had the happiness to find, that my suggestions were approved of by the Court of Directors, and orders issued by the Madras Government to have them complied with.

Since my arrival in Bengal, at the close of 1793, my thoughts have been frequently taken up with this important subject, and I have now added such remarks as time and more information have brought to my knowledge respecting the soil, state of the weather, and the husbandry of the Hindoos, which may, in some measure, tend still more to lessen the effects of a failure or deficiency of the rice crop ; whether arising from too little or too much rain, or from storms, for against the scourge of hostile invasions there is no remedy but a superior force; and although we have been without apprehensions of famine, or even scarcity, for many years, yet our endeavours to avert any future appearance of such a direful calamity ought never to slacken, until some suitable commercial arrangements and permanent system of husbandry are established over *British India* at least, as will effectually relieve our minds from every danger of famine from a failure of the rice crop.

Granaries have been found defective, attended with so great a waste of grain, and so much expense, as to have rendered it advisable to discontinue or abolish them for the present.

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The preservation of grain, (rice,) from the excessive damps of *Bengal*, and from the ravages of myriads of insects with which such climates abound, has hitherto been found impracticable. In Europe frequent screenings and ventilations have, I believe, been found the best methods; but there such a task may be called an amusement only when compared with what it would be in *Bengal*, even granting it would prove effectual there, which has not been found by experience.

On the coast of *Coromandel* grain is easier kept than in *Bengal*, because the land is so high in most parts as to admit of its being preserved in *subterraneous* granaries, made so deep as to place the grain, or roots, below the level at which they vegetate, as practised in many parts of *Russia*, and for potatoes, &c. in *Scotland*, in consequence of less humidity there, which is universally known to be highly injurious to grain, and at the same time favourable for the multiplication of insects. On that coast, *subterranean* granaries might therefore be attended with greater success than in Bengal.

To a person acquainted with the soil and state of the weather over the provinces immediately under the supreme government, and the various sorts of culmiferous and leguminous plants, excellent roots, herbs, &c. &c. that thrive so very luxuriantly during the cool season, I say, to such a person it will appear next to impossible for a famine, or even scarcity to take place, although no such grain as rice was known.

By the month of October it can be ascertained whether or not there will be a failure of the rice crop. If there is reason to think so, let the ground where the *paddy* has failed, or been cut, which will have been the case of the *rubbee* crop, and as much more as may be thought ad-

visable, be prepared for *wheat* and *barley*, *leguminous* grain and roots*.

The *leguminous* plants cultivated over *India* during the cool season, are much more numerous than the culmiferous, and though they do not by any means make so large a proportion of the diet of the Hindoos and Musselmen, yet they are very generally eaten; and to be found for sale in every market. The most conspicuously useful are *pease*, *motor hind*, of several sorts—*Kcessari*, *Lathyrus Sativus*; *Sona Moog*, *Phaseolus aureus*; *Halli-Moog*, *Phaseolus mungo*, *Krishna*, or *Khalli-Moog*, *Phaseolus max*; *Mash-Kally*, *Phaseolus radiatus*; *Moot* (*Phaseolus aconiti foliüs*.) Of the genus *Dolichos* there are, *Coalthi*, *Barbaty* and *Lobia* (*Dolichos sinensis*,) and their varieties. Of *Cytinus*, viz. *Cajare*, there is only one species, *Oroos*. Of *Cicer* there is also only one sort, viz. *Arietinum*, *Bhoot*, or *Bhoat Kalai*; and of *Ervum* one species, viz. *lens*, or *Mussoer hind*. These are the principal leguminous plants known to me that are cultivated by the nations during the cool dry season, viz. from October to March, inclusive.

Tuberous roots.—The sorts that succeed during that season are few, compared to the number that require to be put in the ground when the rains begin. I know only of two (cool season roots) that can be considered interesting, viz. the common *potatoe* of *Europe*, and the *sweet potatoe* (*Convolvulus batatus*) or *Kokor-cunda alloo* of the Hindoos.

* The harvests over *India* are divided into two periods, or crops, the *Klnereef* and *Rubbee*, of the Hindoos. The former, or early crop, is cut in September and October, and the latter, or great crop, from December till March, or even April.—See As. Res. p: 6, 45, &c.

The kinds of grain which compose the *Kereef*, or early crop, will be of use over the southern parts of the *Peninsula*, but not, I fear, to the northward, as they thrive best, and are cultivated during the rains. They are the various sorts of *Holci*, comprehending the much esteemed wholesome grains, known to the Hindoos by the names, Bajerah, *Holcus spicatus*; *Joor*, (*Holcus Sorghum*); and *Deduhn*, (*Holcus bicolor*.) Three species of *Panicum*, called in *Hindustanee*, *Cognee*, (*Panicum italicum*); *Chinna*, (*P. pilosum*), and Saumah; (*P. frumentaceum*; also Indian corn called *Bhoattah*, or *Mukka*, by the natives, *Murhna*, (*Cynosurus Crocanus*); and *coda-ka-churot* (*Paspalum frumentaceum*). These are all well known to the natives, and in many parts of *India*, form almost the whole of their food. See *As. Researches*, 6, p. 49. On such our chief dependance ought to be placed, for the farmers of *India*, above all others, rely entirely on the practice and experience of their ancestors, and not only condemn experiments as absurd and unnecessary, but look on them as impious; hence their dislike to the introduction of any thing new in their husbandry.

Potatoes have been known to the natives of *Bengal* more than half a century; at least, to such as reside in the vicinity of European stations: yet it is only near such places where they are reared, because there they meet a ready sale; for though the Hindoos in general like them as a luxury, yet they have not hitherto made them any substantial part of their diet. From such stations, as from so many centres, we may yet expect to see the culture extended. Such lands only as best suit this root ought to be employed, because a few bad crops would throw a great check in the way of its progress, and ought to be particularly guarded against.

For this root, the soil ought to be an open sandy loam, manured with either horse or cow-dung ; and the sort or sets and soil changed every few years ; for we know, from long experience, that growing plants absorb from the soil such food as suits their nature ; if, therefore, the same crop is long continued, it will degenerate. Hence, the necessity of rotation, as land exhausted of the food of any tribe, or species, (say wheat) by one or more crops, yet it may contain the proper food of many other vegetables. A light friable virgin soil, (of which there is much scattered over *India*, at present in a state of nature,) I have found produce excellent crops of potatoes at *Samulcatale*, near *Coringa*, on the coast of *Coromandel*, and in the Botanic Garden at *Calcutta*. The worst soil for potatoes, or for tuberous roots in general, is of a hard gravelly nature ; much of the waste, or uncultivated *jungly* land over *India*, is of this kind, and frequently intermixed with more or less calcareous grit, (*Kunkur* of the Hindoos). Stony, chalky, and stiff clay land, are also unfit for this crop ; I mean in *India*, for my experience does not extend to *Europe*. The sets to be three, or at most, four inches deep, and one inch above the dung. Doubtless a potatoe crop, as in *Europe*, leaves the land in excellent order for any succeeding crop, which is another great inducement for changing the soil. It has been found, that various sorts spring from the seed of the same plant ; it will therefore be advisable to preserve the seed of such as grow best in any particular soil for experiments. If the sets are cut a few days before they are put in the ground, they are not so apt to rot, as when set immediately after they are cut. Large potatoes make better sets than small ; and where sets are scarce, or a new sort wished to be multiplied, they may be cut into two or more pieces ; but I believe it has been found
that

that the weight of the crop is in proportion to the weight of the sets; this remark I have found verified in *Bengal*. In *India*, as in *Europe*, the young plants require earthing up, and the ground kept clean and light as possible, which makes the roots shoot farther, and the tubers grow larger. Cutting off the tops of potatoes at all times injures the crop.

No axiom is better known, or can be more easily discovered at first sight, than that a constant ready market and good price for the produce of labour, are the best encouragements that can be held out to the cultivator. The greatest part, if not the whole, of *British India*, immediately under the Supreme Board, produce, on an average, more grain than is necessary for its consumption, consequently, to give encouragement for a more extensive and better regulated system of husbandry, every encouragement ought to be given to the exportation of grain. The charges and dangers attending the port of *Calcutta*, and the increased price grain must be raised to, by bringing it to that port from the districts where it grows, might, in a great measure, be avoided, if one or more safe, commodious ports could be found to the eastward, and in our new and valuable acquisition *Cattack*, where grain is more abundant in proportion to the consumption, than on the banks of the *Hougly*. Such a scheme of exportation carried into execution, and returns made in *salt*, would prove one of the greatest reliefs to these provinces in times of scarcity, by enabling us to retain, by embargo, the surplus grain which the export trade would soon produce in the market, and for at least the lower parts of *Bengal*, surpass every other means that can be devised. And for the interior, wheat alone may be sufficient; at least our greatest dependence ought to be placed on it: for, above all other farinaceous

grains, it contains the largest portion of gluten, or nutritive principle.

An European requires no proof to make him sensible of this ; but the natives of *Bengal*, and other *rice** countries, may. Let them therefore compare the race of men who inhabit the upper provinces, &c. West and north-west, the chief crop and staff of life is *wheat* ; I say, let them compare those people with themselves, who eat little else than rice, and they must be immediately convinced of the superiority of *wheat* as the food of man.

I have often, with delight, remarked and admired the great bounty of Providence, in thus abundantly supplying the wants of man, in all climates, with the most proper materials for his food, clothing, and medicine ; and for the employment of his industrious ingenuity. Probably no country in the world enjoys these blessings in such abundance as *Bengal*. A very small share of assiduity must, at all times, place its inhabitants out of the reach of famine, or scarcity, from even a total failure of the rice crop ; and in times of plenty, indeed at all times, affording numerous other objects for their industry. Ignorant and careless must be the husbandry of a country, where the rights of the husbandman are trampled on ; and this seems to be more prevalent in fertile *Bengal*, than over the less productive lands of *Coromandel*, where industry and skill are more wanted to render their lands sufficiently productive : for, where nature has been most lavish of her favours, as in *Bengal*, man has less to do, and more apt to indulge in idleness. To those already known, many products now

* Previous to the famine of 1769 and 70, the average price of rice was from 27 to 29 *seers* per rupee. Since that time cultivation has become more extended, and the average price may be stated at 40 *seers* per rupee.

may be added, which, by our own activity, aided by the cheap labour of the natives, may be exported to *England* to the mutual benefit of both countries. Such as the beautiful sorts of timber. The *Tanning* (*Tannin*,) or *astrin-gent principle* of vegetables, much wanted in *England*, and I believe no country abounds more in it than this. *Wheat**, *Rice*, *Wax*, *vegetable Oils*, *Lac* and *Larlake*, *Glue*, *Tobacco*, *Indigo*, *Saltpetre*, *Sugar*, *Silk of several sorts*, *Manjith*, of the *Hindoos*, or *Indian Madder*, both wild and domesticated. *Cotton* for *China*, as well as *Europe*. *Bengal* will, no doubt, soon be able to furnish in abundance, after supplying her own manufacturers, in consequence of our late conquests in *Hindoostan*, substitutes for *hemp* and *flax*, &c. &c. And for her own marine yard she has, I believe, every thing except *copper* within herself. Timber of various excellent kinds in great abundance, even *Teak*, will soon be plenty. For cordage and canvas, various excellent materials abound.

* It is now six months since Dr. Roxburgh and family left *Bengal*, and he with pleasure observes, that the *Soojee*, or coarse powder of the heart of the *Bengal wheat*, which he brought with him for various uses, particularly for his childrens' diet, continues perfectly good, and may, he thinks, from its present appearance, keep good as many months more. Now, his object in making this observation, is to point out the prospect of relief this preparation of wheat holds out to *Great Britain* and her Colonies when pressed for wheat. Dr. R. suggested to Lord Mornington, when he was Governor General, the idea of sending some of this preparation to *England*, by way of experiment; for surely it is well to know our resources before want pinches.

" *St. Helena*, August, 1813.

"The same *soojee* continues perfectly good, a pretty large sample thereof I have just sent to Mr. Cobb, the Secretary at the East India House, with a short letter to the above effect, to be laid before the Hon. the Court of Directors, with the view of encouraging the importation of this salubrious preparation of wheat."

London, August, 1814.

Iron

Iron every hill furnishes. The ore of *Rajamalel* hills is said to be of the very best kind, and in plenty. *Dammer*, which answers I understand every purpose of *pitch*, is to be found abundantly in every forest where the *saul*, and other trees that yield it, grow. The range of mountains which circumscribe *Bengal*, *Behar*, *Oud*, and *Rohilcurid*, to the north and north-east, can furnish *masts*, *tar*, and *turpentine*. To these may now be added several new species of *oak*, natives of the *Garrow* range, and other mountainous districts in the vicinity of *Silket*, many of them growing to a great size, and yielding timber of an excellent quality for a variety of purposes.

QUERIES by Government, respecting the Abolition of the public Granaries ; with the ANSWERS by the Board of Revenue.

Q. Whether any public Establishment be necessary in the present state of the country, in order to prevent or to mitigate the fatal effects to be apprehended from a scarcity of grain?

A. Precautions to avert or to mitigate the fatal effects resulting from scarcity of grain, have, upon former discussion of the subject, with great apparent reason, been deemed necessary ; and the same necessity for such precautions, if any can be devised, appears to us, in the present condition of the country and its inhabitants, to exist with equal force.

Q. Whether, on a presumption of such necessity, the present establishment can be considered adequate to the object proposed ; or, if insufficient, whether it be susceptible

ble of any modification, which would render it adequate to this object.

A. The present stores of grain would, in the proportion which their magnitude might bear to the degree of scarcity, answer the proposed purpose of averting or mitigating the fatal effects of the scarcity; but, in the greatness of the expence at which the granaries are maintainable to us, there appears an insuperable objection to their continuance; and since we do not conceive this expence to be susceptible of reduction within moderate bounds, the establishment of the granaries should, in our opinion, be abolished without delay.

Q. Whether, on a presumption that the present plan is defective, any other arrangement can be adopted, exempt from similar objections, and affording a satisfactory assurance; that Government, in making a considerable pecuniary sacrifice for the benefit of the public, will not be disappointed, either with regard to the extent of the relief proposed to be secured to the community, or with respect to the general effect of the Institution?

A. The only plan free of conclusive objection, that could be substituted for the granaries, would be to resolve on appropriating a sum of money whenever it might be wanted, for the purpose of purchasing grain, and of conveying it to the parts of the country where a scarcity, requiring such a relief, might prevail; or of procuring relief by bounties to individual traders; or by any other pecuniary means which the exigency of the case, and the then existing circumstances of the country, might point out.

With a view to the same relief, and independent of other motives, we think it would be advisable to encourage as much as possible, a regular annual exportation of grain from these provinces; because a great part, if not the whole

whole, of the surplus upon the cultivation and produce necessary for internal purposes, which the demand of grain for exportation would occasion, might at any time be retained by embargo, and thrown back upon the markets.

The quantity of rice exported from the port of Calcutta alone appears, on an average of the five last years, to be no less than 980,000 maunds, which is an increase of one lack of maunds per annum, on the average of the six preceding years; and this we consider as furnishing a store, which, by embargo, might be resorted to in the event of a scarcity of grain.

In the event of your Lordships determining to abolish the establishment of granaries, it would be unnecessary for us to observe, that the effect produced on the markets, by the present demand of cargo rice for *Europe*, might afford a favourable opportunity for disposing of the grain in store.

STATISTICAL TABLE, (POLITICAL ECONOMY.)

QUERIES for the BOARD of REVENUE (by request) to send in circulation amongst the COLLECTORS; with the view of having the blank columns filled by them which will help to guide us in pointing out the sorts of GRAIN and ROOTS most proper for cultivation in the several Districts, when there is reason to fear a failure of the RICE CROP.

<i>English or Botanical Names.</i>	<i>Hindustani Names.</i>	<i>Seed Time.</i>	<i>Seed, per Biggah.</i>	<i>Biggahs cultivated.</i>	<i>Time of Harvest.</i>	<i>Product per Biggah the spot.</i>	<i>Charges of cultivation.</i>	<i>Remarks on the nature of the soil, preparation, manure, sowing, irrigation, and of any other nature that may be thought necessary.</i>
Rice* or Paddy	Chawal rice, Dhan Paddy							
Wheat	Corn or Ghow							
Barley	Jow							
Cynodorus corocanas	Muthua							
Holcus Sorghum	Jooar							
... spicatus	Bajorah							
... creolus	Dedahn							
Panicum italicum	Cognee							
... pilosum	China							
... frumentaceum	Saunah							
Indian Corn	Bhoorah or Mukka							
Paspalum frumentaceum	Coda-ka-chawal							
Pease	Moat							
Phaseolus Aureus	Soua-moog, or moag							
... mango	Halli, moog, or moag							
... max	Halli, or kretnamoog							
... radiatus	Mash-cally, or callach							
... Aconit: foliis	Moat, or Moat							
Dolichos biflorus	Coolih							
... caryag	Barbaly, or Barbudy							
... sinensis	Loba							
Cicer arietinum	Bhoor, or Bhoocalai							
Bistis Cajan	Orror, or Orror							
Lathyrus sativus	Musoor							
Potatoes	Kessari, or Kassare							
Arum Colofasia	Barati-illoo							
... indicum	Kachoo							
... campanulatum	Maun-kachoo							
Sweet Potatoe	Ol, or Bol							
Yams, various sorts	Kokorcundo-illoo							
Curcuma Augustifolia, yielding Ticoorhindi, or real Arrow-root	Aloos							
Cucurbitaceae, the edible or dictic sorts								

* The varieties of this most useful grain cultivated over Asia are endless. On the coast of Coromandel alone, I detected and described above forty, all well known to the native farmers. The original wild stock, from whence I am inclined to think all have sprung, is still common on the borders of lakes, pools, &c. during the rainy season in many parts of India; its Sanscrit name is Nirara: the grain of this wild sort is much esteemed by many of the natives of the Northern Circars.

† The vacant lines below, are for inserting any other sorts of grain or roots, not in the Table, and for trees, perennials, &c. which produce edible fruit, &c. such as sage trees, plantains, cocoa nut trees, &c.

*The SILVER MEDAL of the Society was this Session voted to Captain JOSEPH COTTON, of the Trinity House, and a Director of the Hon. East India Company, for his great exertions in the Culture and Importation of Caloeee Hemp from the East Indies, the produce of a Plant named by Dr. ROXBURGH *Urtica Tenacissima*. The following Communications were received from Capt. COTTON, and Samples of the Hemp, with an original Drawing of the Plant, are preserved in the Society's Repository, along with several different Pamphlets sent from him upon the subject.*

DEAR SIR,

I HAVE the honour to address you on the Caloeee hemp, noticed to you by Dr. Roxburgh under the name of *Urtica-Tenacissima*. This parcel I have at length discovered in the Company's warehouse: I have applied to the Chairman to direct its delivery to you, which I have no doubt will be done; but it was not addressed to me, or I should have had notice of it.

Was I to furnish you with all the correspondence that has passed on the substitutes for hemp between Dr. Roxburgh and myself, it would compose a large volume. In fact, I have been most zealous upon this topic, and have taken some pains to render this country independent of the supplies from Russia, by pointing out how the weaker fibre of India produce might be made, through Huddart's Principle of Manufacture, equally useful with the Russian hemp,
par-

particularly if proper selection and culture were observed in India, this might stand us in great stead in the event of future disputes with the northern powers; but the return of peace has for the present affected, not only the importation to any extent, but the culture of it, also the improvements suggested, unless for the use of shipping in the East Indies, and where I find they have lately discovered the means of incorporating tar with their coir, or the fibre of the cocoa nut, which is a much stronger material. Prejudice may, perhaps, eventually be the means of neglect, even of the Caloocan hemp, so much and so deservedly the object of Dr. Roxburgh's attention. Before Sir Evan Nepean went to Bombay, I attended both Lord Melville and him to an inspection of these latter materials, and highly satisfactory was the result.

It might be advisable, notwithstanding all that has been said or done on this important matter, to cherish the improvement throughout India, and which I shall endeavour to effect on my return in April to the Direction. I take the liberty of forwarding to you some publications of mine, which will evince the interest I took on the subject; and having furnished both Lord Moira and Sir Evan Nepean with copies, I hope, from the communications they have honoured me with, that it will not be overlooked.

The sentiments of respect I entertain for your laudable Institution, will lead me ever to receive your further commands on this, and any other matters in which I can be useful, with great satisfaction; and I hope the President and Members of the Society will accept the tenders of my best regard and good wishes for the prosperity and success of these

these highly useful endeavours toward the public advantages of this happy and favoured country.

I have the honour to remain,

Dear Sir,

Your very obedient and
Faithful Servant,

JOSEPH COTTON.

Layton, Essex, Dec. 19, 1814.

TO C. TAYLOR, M.D. SEC.

SIR,

I AM commanded by the Court of Directors of the East India Company to acquaint you, that the Court, understanding from a communication made by Joseph Cotton, Esq. that the Society of Arts, Manufactures, and Commerce, would be glad to receive a specimen of the Calooee hemp, prepared by Dr. Roxburgh during his residence in Bengal, the Court now present to the Society a bale, weighing about one hundred weight, which came by the ship Cambridge to England, in 1812; and I am to request the favour of receiving a copy of any reports which may be made to the Society thereupon.

I have the honour to be, Sir,

Your most obedient,

Humble Servant,

JAMES COBB, SEC.

East India House, Jan. 19, 1815.

TO C. TAYLOR, M.D. SEC.

DEAR

DEAR SIR,

SINCE I last wrote to you, I have not only found the drawing of the Calooee plant, but a more particular description of it, which, for the sake of distribution, and to save the trouble of copying, I have directed twenty sheets to be struck off by the press, some of which shall accompany the copy of the drawing.

Mr. Lee's invention I have also seen; its operation is so simple and effectual, that the wonder is that no one should have before this introduced the idea.

Three gentlemen, with myself, of the Court of Directors, had a very satisfactory inspection of its effect, and we are disposed to recommend the Court to send out several to the President in India, which will enable them to furnish a material for cordage and sail-cloth, so strong, so pure, and in such order for manufacture, that the wants of this country, under any emergency, may be supplied.

I am, dear Sir,

Your obliged and obedient servant,

JOSEPH COTTON.

Layton, June 24, 1816.

TO C. TAYLOR, M. D. SEC.

DEAR SIR,

I AM induced to believe that at some future period we may be under the necessity of resorting for hemp to other parts than Russia, at least it is prudent to be prepared
O against

against such an emergency; I shall therefore renew my communications with the present Botanical Superintendant at Calcutta, to stimulate the cultivation of the Calootee, having already written to Earl Moira thereon very fully, and which will, I trust, not suffer the neglect of this newly-established attempt at a substitute for hemp to languish, or be suppressed. I will furnish a few copies of the book I sent to the Society. Many are about to be sent to the residences in India to keep the spirit alive. Improvement must result, and if they benefit there so far as to the exclusion of cordage made from Russian hemp, the foundation of a supply will be laid for a time of scarcity here.

You will, I have no doubt, admire Dr. Roxburgh's zeal and endeavours.

I remain,

Your very sincere, and

Humble servant,

JOSEPH COTTON.

Layton, Dec. 11, 1815.

TO C. TAYLOR, M.D. SEC.

SIR,

IN order to forward the views of the Society for the Encouragement of Arts, &c: we requested Mr. Lee to prepare some of Dr. Roxburgh's Calootee hemp, by his patent machinery, to ascertain the relative value of the Calootee hemp, and we beg leave herewith to enclose Mr. Lee's letter,

letter, containing the result of his experiments, for the information of the Society.

We are, Sir,

Very respectfully,

Your obedient servants,

COOKE, FISHER, & Co.

Agricultural Repository, June 14, 1815.

To C. TAYLOR, M.D. SEC.

GENTLEMEN,

IN reply to your favour of yesterday, and for the information of the Society for the Encouragement of Arts, &c. concerning the fibre which you sent to me under the name of Calooee hemp; it appears to have been peeled off the plant while the plant was in a green or wet state; and this circumstance renders the fibre of much less value in the state in which it is imported. It also renders it more difficult to be cleared from the bark and extraneous matters, than it would be if the plants were taken dry, without water steeping or dew-rotting. But when the article is cleaned it is strong, soft, and free. Under proper management the fibre of this plant would be of more value than the best Russian hemp for most of the purposes for which hemp is used, and it may be made so fine, that in many cases it would answer the purposes of flax.

I am, Gentlemen,

Your very obedient servant,

JAMES LEE.

Oldford, June 14, 1815.

To MESS. COOK, FISHER, & Co.

Agricultural Repository.

*Remarks on and further Description of the Calooc Hemp,
or Urtica Tenacissima. R.*

Shrubby, erect, ramous; leaves alternate long-petioled, broad-cordate, grossly serrate, hoary underneath; panicles axillary; flowers in round fascicles; the male on the lower panicles, and the female on the superior.

RAMEUM MAJUS. *Rumph. amb. 5. p. 214. t. 79. f. 1*, which is a very bad representation of our plant, but as the description agrees pretty well, we may conclude they are the same.

RAMY of the Malays or *Pullo Penang*.

GALOOEE, *Marsd. Hist. Sum. 75*.

KANKHURA, or KUNKOORA, of the inhabitants of Rungpoor, where the plant is cultivated for the fibres, of which the fishermen of that district make their fishing-nets.

It is a native of the island of Sumatra, &c. where it is cultivated for its fibres, which are abundant and of very great strength and fineness. In the Botanic Garden at Calcutta, (where it has been introduced from all the three places above mentioned) it grows very luxuriantly, and blossoms about the close of the rainy season, in October and November. To procure the fibres, Marsden says, the shoots are cut down, dried, and beaten; after which the rind is stripped off. Rumphius's *Ramium Majus*, which I take to be this, yields also fibres of the same nature, and is quoted by Wildenow for *Urtica Nivea*, which from the prevailing definition of that plant, "*Folius suborbiculatis utrinque acutis, vel basi attenuatis*," I must conclude to be a different species; for in all the plants in the Botanic Garden, originally from Sumatra, from Prince of Wales Island,

Island, and from Rungpoor, they are uniformly broad-cordate. Both male and female inflorescence glomerate panicles. Calyx of the latter of one leaf, and the germ destitute of the barren filaments which Lourieros gives to *U. Nivea*.

DESCRIPTION.

Stems when suffered to remain, they become stout and ligneous, and then covered with brown somewhat scabrous bark.

Branches many, spreading considerably, even drooping; the ligneous parts with bark like the stems; the tender clothed with diverging, soft, white hairs. When cut down to the ground, numerous straight, simple shoots soon spring up to a height of from one to eight feet, according to the season, quality of the soil, &c.

Leaves alternate, long-petioled, cordate, grossly serrate, acuminate, hairy, and hoary underneath, three-nerved; from three to six inches long, and from two to five broad.

Stipules uniform, one on each side of the insertion of the petioles.

Panicles in axillary pairs, glomerate, about as long as the petioles, villous.

Flowers numerous, small, greenish yellow, collected in small globular heads; male on the inferior panicles, and female on the superior.

Bractes minute and mixed amongst the subsessile flowers,

MALE.

Calyx of four ovate, concave leaflets,

Corol none.

Nectary a globular pedicelled gland on the centre, resembling a pistillum.

Filaments four, *anthers* two-lobed,

O 3

Female

FEMALE.

Calyx one-leaved *, oblong, hairy, mouth entire, much contracted, and embrace so closely the base of the style, as to appear the tunic of the *ovula*, which is single, and attached to the base.

Corol none,

Stamina none.

Germ oblong, minute, no filaments surround it, (as in Lourieros *Urtica Nivea*). Stigma single, hairy, and about the length of the germ.

Seeds, they have not been found in a ripe state.

1810. We have now had this plant six years in the Botanic Gardens; the roots of the original shrubs, as well as their progeny, are becoming daily more extended, and continue healthy and vigorous; throwing up numerous shoots as often as they are cut down for the fibres of their bark, which may be done about three or four (rarely five) times every year, if the soil is good, and care taken of the plants, viz. keep them clear of weeds, water them when the weather is so dry as for the soil to require irrigation, or carefully drained when too wet.

It is as readily cultivated from cuttings as the willow, which is fortunate, as I have never yet found it produce fertile seed. Various ways have been tried to clean the fibres of the bark of this plant, since its introduction into the Botanic Garden. That recommended by Marsden has always completely failed with me.

The following account of the plant, and mode of pre-

* When I first described this plant, I had not discovered this organ and there simply stated its absence; I have, however, with the help of a powerful lens, detected it.

paring the fibre, was sent from Prince of Wales Island, with some of the plants, by Mr. Phillips, who says—

“The *Ramy* plant is hairy, and thrives almost any where, but grows most luxuriantly if a little shaded, and planted in a young soil: it extends its root like the yam, throwing out from it shoots which spring up perpendicularly, attaining in four months, the height of eight or ten feet, when they flower, and are become fit to be cut down. From the root other shoots again spring up, which in two months more will be again fit to be cut, and so on successively, I am told, for almost any period, becoming in a short time a complete jungle. In forming a plantation of it, it is therefore not necessary to plant out the seedlings higher to each other than two or three fathoms. The Malays use the fibre for sewing thread and twine, and for making fishing-nets, and the quantity is so small that they require for these purposes, that they have not had recourse to any particular mode of stripping or cleaning it; they merely steep the shoots in water for ten or twelve days, and then peel off the bark, and dry it in the sun. I have *heard* that the thread is injured by salt water, but I do not think the account I have had of the circumstance is to be depended on, and certainly from the nature of the plant, the facility with which it appears, it may be cultivated to any extent, the great strength of the fibre, and the threatened scarcity of ropes for the use of the Navy, it is worth while making experiments of it.”

This method failed as completely as Marsden's: indeed only two or three days maceration renders the fibre as tender as bad flax, and does not tend to render the removal of the tenacious pulp, which envelopes them, less difficult

to remove. Every kind of steeping, scalding, and coction that could be thought of, have been tried in vain.

The late Dr. Charles Campbell, of Bencoolen, directs the shoots to be cut when about six feet high, and immediately stript of the bark, and its exterior green coat scraped off: this is the whole process which he says the Malays about Bencoolen follow, when the fibre is wanted for common twine, and coarser purposes; but when wanted of a bright colour and fine, he says, the scraped fibres are put into a vessel with warm water, and steeped for two days and two nights. Nearly the same practice is followed in Rungpoor, and is what I have hitherto found the best. It is tedious, as at first a man rarely cleans more than half a pound of the fibre in a day, but after some little practice they do nearly a whole pound. Every other mode which I have tried, particularly maceration of any kind, weakens it more or less, according to the length of time it has been continued. From this quality of the fresh fibre, we might be inclined to think it an improper material for fishing-nets, &c. employed in water, which, however, does not seem to be the case.

During the rainy season, that is from June to October inclusive, from two to three months is the usual time the shoots require to be fit for cutting: and about the same time during the hot season, say from March till May inclusive, if there are frequent showers, which is often the case; or irrigation answers the same end: the other four months of the year its vegetation in Bengal is slow, and in that period can be reckoned only capable of yielding one crop of shorter and firmer shoots, fit for cuttings to propagate by.

W. R.

To

TO JAMES MONEY, Esq.

Secretary to the Board of Trade.

SIR,

I Have received your letter of the 17th inst. with the two Extracts therein mentioned, and beg you will be pleased to inform the members of the Board of Trade, that since the beginning of my botanical career, no plant has given me more anxiety than that which produces the Calooc.

From the receipt of the first sample sent to me by Mr. Ewer from Bencoolen, I saw its quality was uncommonly interesting, and promised to be superior to every other vegetable fibre I had seen. I was therefore more than usually solicitous to obtain the plant which produced so promising a material, as a substitute for both hemp and flax, and in 1803, four were received into this garden, from Mr. Ewer at Bencoolen; since which period, some thousand plants have been reared from these four, so readily does it grow and multiply. But to this day I have not been able to discover a ready way to clean the fibres. At present a man rarely cleans more than half a pound in a day, which alone comes to sixteen rupees the maund. I understand the Malays on Sumatra follow the same mode of cleaning which I have hitherto found the best, viz. by scraping away the pulpy parts, &c. immediately when peeled from the fresh cut shoots: no kind of maceration nor coction have I found to answer; however, as I have applied for information to various quarters, and am still making experiments myself, I do not yet despair of falling on a more profitable method than scraping. The plant has every advantage we could wish in growing readily

dily in this country, being perennial, and yielding three or four crops or cuttings annually ; so that if we can only overcome the obstacles that now present themselves in cleaning the material, I am inclined to think it would in the course of time supersede every other material, for canvas and cordage, yet known. I would therefore, by all means, recommend as extended a cultivation as the plant will admit, which must be very limited for years yet to come, because it has not hitherto produced good seed, nor even from its native country could I ever obtain any, which is scarce to be expected from a plant usually reared from cuttings and slips, (as in the common pine-apple, plantain, &c.) a mode of culture which soon deprives them of fertile seed. This plant must therefore be multiplied by suckers, cuttings, and layers, which can best be done during the rains.

This garden will contain all that I can rear for at least one or two years ; it cannot therefore in any way interfere with orders of the Honourable the Court of Directors, for the provisions of Sunn for years to come.

The labour in this garden has, within these few years, been so very much added to by the extensive plantations of Teak adjoining, and lately by making experiments on the culture and preparation of Sunn, that it will not be in my power to do justice to this new branch of rural economy, without some addition to the number of labourers now employed ; I must therefore beg the Board will be pleased to apply to Government for permission to employ an additional number of twelve men, that advantage may be taken of the first rains of the season, to peel off the bark, and clean the fibres of the viscid mucilaginous pulpy matter with which it abounds. Convicts may be employed,

ployed, but to multiply and cultivate the plant, I cannot make these people serviceable.

I am, &c.

(Signed)

W. ROXBURGH,
Botanical Superintendant.

Botanic Garden, March 22, 1809.

A true Copy.

(Signed)

JAMES MONEY, Secretary.

A true Copy.

HY. ST. GEO. TUCKER,
Secretary to the Government.

N. B. The introduction of Mr. Lee's machines into the East Indies will, it is expected by Capt. Cotton, obviate many of the difficulties which have occurred in the preparation of this fibre, and it is hoped that considerable quantities will soon be imported in a perfect state.

* * It is a curious circumstance, that at the time the Calooee hemp, the product of Sumatra, in the East Indies, was under the investigation of the Society, a similar plant and fibre was submitted to their consideration by Mr. CHARLES WHITLOW, under the name of *Urtica Whitloena*, discovered by him on the borders of the various lakes in Canada; it is a perennial plant, produced there without culture in great abundance.

The SILVER MEDAL was this Session voted to Mr.

CHARLES WHITLOW, of Canada, for his Method of preserving Potatoes for Sea Stores, or foreign Consumption. The following Communication was received from him.

SIR,

THE usual mode at present practised for endeavouring to preserve potatoes, is to leave them after digging exposed to the sun and air until they are dry, this exposure generally causes them to have a bitter taste, and it may be remarked, that potatoes are never so sweet to the palate as when cooked immediately after digging. I find that when potatoes are left in large heaps or pits in the ground, that a fermentation takes place which destroys the sweet flavour of the potatoes, in order to prevent that fermentation, and to preserve them from losing the original fine and pleasant flavour, my plan is (and which experience proves to me to have the desired effect) to have them packed in casks as they are digging from the ground, and to have the casks, when the potatoes are piled in them, filled up with sand or earth, taking care that is done as speedily as possible, and that all vacant spaces in the cask are filled up by the earth or sand; the cask thus packed holds as many potatoes as it would was no earth or sand used in the packing; and as the vacant spaces of the cask of potatoes so packed are filled, the air is totally excluded, and cannot act on the potatoes, and consequently no fermentation can take place.

I sailed from New York to St. Bartholomew's, and brought with me two hundred barrels of potatoes packed in the above manner; on my arrival at the island I found,

as I expected, that the potatoes had preserved all their original sweetness of flavor; in fact, as good as when first dug, having undergone no fermentation, nor in the slightest degree affected by the bilge or close air of the ship. Some barrels of the potatoes I sold there, and at the neighbouring islands, for four dollars per bushel; and at the same time potatoes taken out in bulk without packing, and others that were brought there packed in casks, which had not been filled up with earth, sold only for one dollar per bushel, they being injured in the passage by the bilged air and fermentation, being bitter and bad, whilst mine were as perfectly sweet and dry as when dug: what remained I shipped from St. Bartholomew's to Jamaica, where they arrived in equal good condition, and sold at a higher price than they had brought at the former island; some of these casks of potatoes were put in a cool cellar by the purchaser at Jamaica, and on examining them when I was leaving the island two months after, I found that they had, in a very small degree, sprouted, but that all their original flavour was preserved. Reflecting seriously on this discovery, it suggested to my mind the idea of proposing to the British nation a mode of supplying their West India Colonies with a good and wholesome food for the negroes, and also for the white people, and which would find an additional market for the farmer at home, a valuable freight for the merchant, and a more extended market for the lumber of the North American Colonies, viz. of Canada, Nova Scotia, &c.

It is well known that our ships in the West India trade in general go out in ballast, or not more than one-third freighted, carrying out some small quantity of European commodities; but the bulk of their freight consists of empty casks, and materials for making casks. It is also well

well known how valuable a food potatoes are in the West India islands, and how much they are prized there ; no one acquainted with the West Indies and its commerce, but must be aware how much labour of the unfortunate negro is at present employed in making casks, puncheons, &c, for bringing home the produce, and of what immense value casks are there. Let timber imported from our North American colonies be made into casks, hogsheads, rum puncheons, coffee barrels, &c. &c. let these be filled in my mode, as described with potatoes, I contend, that the value of the casks which bring out potatoes will more than compensate for their freight, and the earth will keep the cask perfectly sweet and ready, without any labour, to bring home any produce.

The potatoes must come cheap to market, the ship owner can afford cheap freight, having now none, or next to none, for his outward-bound vessels.

The farmers on the sea-coast can easily supply more than two hundred thousand tons of potatoes, and the population of the West India islands would consume more than that quantity.

Any overplus required may be readily supplied in like manner in Nova Scotia, Cape Breton, Canada, &c. The food of the negro is at present Indian corn and meal, which, with a small quantity of potatoes now used in the islands, was formerly principally supplied by the United States, who received in return, in cash and produce, nearly ten millions of dollars. Potatoes and fish, together with the produce of the islands, will give a much more wholesome food, in a greater abundance, and at a more reasonable rate.

The policy of our legislature surely should be to encourage the parent state and the colonies, supplying each other

other in every possible manner, and to discourage Aliens from reaping advantages from British capital, industry, and exertion, more particularly so when by judicious arrangement both the colonies and the mother country can have their wants supplied better from their super-abundant productions than from foreign states, proper encouragement for the fisheries of Newfoundland, with settlements for those employed in that part of the service on the coast of our settlements in North America, is indispensably necessary—markets there are in abundance for the employment of more ships and seamen than we have now in that trade.

By my plan of preserving potatoes, a wholesome food will be provided for the West India islands, much better and cheaper than they possess at present. A valuable freight for our outward bound shipping, which they now want. This plan will in some measure enable the merchant to have his return freight cheaper, and thus we do away with the idea of having our islands dependant on the American states for food. We save an immense sum of money annually given to foreigners; and to the man of humane feeling it must be a source of gratification to see that by this mode the severe labour of the poor black is much lightened, his condition ameliorated, and by having less occasion for his labour, aiding to abolish that horrid traffic of the Slave Trade. We find a market never before discovered for our agricultural exertions, giving healthful and beneficial employment to many families at home and abroad, and a saving to the nation at least of five hundred thousand pounds annually.

CHARLES WHITLOW.

*London, New York Coffee House,
Feb. 12, 1816.*

TO C. TAYLOR, M.D. SEC.

The

* * * The communication of H. B. WAY, Esq. printed at page 45, of the present Volume, on the preservation of Carrots during the winter months, is a confirmation of the plan proposed by Mr. WHITLOW, for preserving vegetable roots a long time fit for food.
